REVISION NUMBER: 4

Purchasing Agent: DAVID GILL
Phone #:   (801) 538-3254
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Item: TRAFFIC VIDEO DETECTION EQUIPMENT

Vendor: 91690A B

AM SIGNAL, INC.
9935 TITAN PARK CIRCLE
LITTLETON, CO 80125

Telephone:	720-348-6925
Fax number:	720-348-6950
Contact:	Arnold Undzis
Usage Reports Contact:	Jane Roche
Email:	amsignal@amsignalinc.com
Brand/trade name:	TRAFICON
Price:	SEE ATTACHED PRICE LIST
Terms:	NONE
Effective dates:	07/15/03 through 07/15/08
Days required for delivery:	15-30 Days
Price guarantee period:	TWO YEARS
Minimum order:	NONE
Min shipment without charges:	
Other conditions:	One (1) – ONE YEAR RENEWAL OPTIONS
	Potentially renewable to July 15, 2008
	This is a Multiple Award Contract, please reference MA1704

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REVISION #4: Please note contract extension through 07/15/2008.
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This contract covers only those items listed in the price schedule. It is the responsibility of the agency to ensure that other items purchased are invoiced separately. State agencies will place orders directly with the vendor (creating a PG in Finet) and make payments for the same on a PV referencing the original PG. Agencies will return to the vendor any invoice which reflects incorrect pricing.

VIDEO VEHICLE TRAFFIC DETECTION SYSTEM PRICING

1.	CAMERA ASSEMBLY	$950.00 each
2.	CAMERA MOUNT	$175.00 each
3.	CAMERA CABLE	$45.00 each
4.	CONTROLLER (to accommodate 4 inputs)	$8,200.00 each
5.	CONTROLLER (to accommodate 8 inputs)	$16,400.00 each
6.	SINGLE INPUT EXPANSION MODULE SYSTEM	$2,150.00 each
7.	ENGINEERING FIELD SERVICES	$35.00 per hour

MISCELLANEOUS ITEMS

1.	Viewcom (Video Compression Module)	$2,452.50 each
2.	Viewcom E Rack	$375.00 each

TRAFFICON PARTS LIST

T1-1	Trafficon Camera Assembly, Video Detection **55080100421**	(1) unit	$950.00
T1-4	Trafficon Camera Assembly, Video Detection	(4) units	$3,800.00
T2-1	Trafficon Video Detection Controller **55080100422**	(1) unit	$2,050.00
T2-4	Trafficon Video Detection Controller	(4) units	$8,200.00
T3-1	Trafficon Camera Mount, Video Detection **55080100423**	(1) unit	$145.00
T3-4	Trafficon Camera Mount, Video Detection	(4) units	$580.00
T4-1	Trafficon Video Detection, 46" Tube **55080100424**	(1) unit	$30.00
T4-4	Trafficon Video Detection, 46" Tube	(4) units	$120.00
T250	Trafficon Camera Cable, Video Detection (250' Spool) x .$.55= **55080100426**		$137.50
T500	Trafficon Camera Cable, Video Detection (500' Spool) x .$.55= **55080100427**		$275.00
T750	Trafficon Camera Cable, Video Detection (750' Spool) x .$.55= **55080100428**		$412.50

T1000   Trafficon Camera Cable, Video Detection (1000' Spool) x .$.55= $550.00
        55080100429

T5-1   Trafficon Video Compression Card (required for fiber interconnect) $2,452.50
        55080100425

T2-2   Trafficon Two Approach Video Controller VIP/3d.2   (1) unit $4,125.00
        55080100435

GENERAL SPECIFICATIONS

1.1 <u>SCOPE</u>. This specification sets forth the minimum requirements for a video traffic detection system. This system will detect all types and classes of vehicles in any weather condition, both day and night. This system must be completely compatible with and conform to NEMA TS-2 standards.

1.2 <u>DESCRIPTION</u>.

    1.2.1   The complete video detection system consists of the Video Camera(s) with mounting hardware, Video Processor, Video Interface, and Cabling.

    1.2.2   Video Processor (Processor) shall utilize advanced detection algorithms and software to detect the presence of vehicles within user-defined detection zones, configured within a camera's field-of-view as displayed on a monitor or computer screen. Whenever a vehicle enters the detection zone, the processor shall identify and detect the vehicle, then shall indicate the vehicle's presence to the signal controller using NEMA TS-1 and TS-2 standards (not concurrently).

    1.2.3   The Processor shall accumulate and store statistical information.

    1.2.4   The Processor manufacturer shall provide written documentation of communications protocols and shall license unlimited use of the protocol to the State.

2   VIDEO PROCESSOR ASSEMBLY

2.1 <u>FUNCTIONAL REQUIREMENTS:</u>

    2.1.1   The Processor shall process the video from a minimum of four (4) camera inputs for a standard four way approach intersection, and shall be expandable to eight (8) camera inputs. In some applications a single approach or dilemma zone detectors may be required. The system shall be applicable and cost effective for all of these applications.

    2.1.2   The basis for this bid is a four input system. Expansion modules shall be available for purchase. See ¶ 6.1.1.1. (It shall be acceptable to have a four input and an eight input models.)

    2.1.3   The Processor shall analyze the video input signals and identify vehicle presence with thirty-two (32) user-defined detection zones per video camera input. The Processor shall be able to analyze a minimum of 128 zones.

    2.1.4   The Processor shall have a display on the front panel indicating the camera input status and processor state. At a minimum, there should be an indication of the following:

2.1.4.1 The Processor is powered and active.

2.1.4.2 There is a valid RS-170, NTSC video signal being detected for each input.

2.1.4.3 The processor has been configured / not configured for detection on the video input.

2.1.4.4 The processor has completed initialization and is processing the video input, ready to detect.

2.1.5 The Processor shall output a detection output to the signal controller anytime that the Processor is not ready to detect.

2.1.6 The Processor shall not miss the detection of a vehicle 99% of the time under all conditions.

2.1.7 In the presence of artifact conditions, the Processor shall not output excess detections for more than 7% of the time.

2.1.8 During the configuration and diagnostic processes, the Processor shall provide a display change on the video output (¶ 2.2.3) or the display of the video interface software (configuration) program (¶ 2.5) to indicate that a vehicle is being detected in each detection zone. Separate indication shall be provided for each detection zone. The indication shall be with change in color or intensity of the detection zone.

2.1.9 Detection zone placement shall be flexible and user-definable as to location on the roadway (within the camera's field-of-view), orientation, area of coverage, direction of travel, and output assignment.

2.1.10 Detection zones shall be able to be overlapped for optimal road coverage.

2.1.11 Groups of detector zones shall be able to be logically combined into a single output.

2.1.12 The Processor shall permit storage and editing capabilities of the configuration. The processor shall be able to store a minimum of two different detector zone configurations.

2.1.13 The Processor, in combination with an agency's laptop computer, shall have utilities to download and upload configurations. The laptop shall have utilities to save and restore configurations on the hard disk. Utility programs shall be supplied by the vendor.

2.1.14 The Processor shall compensate for camera movements. The Processor shall be able to compensate for a minimum movement of $\pm$ 4% sinusoidal movement at 2 Hz for 2 cycles repeated every 10 seconds.

2.1.15 The Processor shall have an output for connecting a video monitor for testing purposes or for connecting a video transmitter provided by others. It shall be possible to select the video image from any of the video inputs. (See ¶ 2.2.3)

2.1.16 The Processor shall accumulate and store statistical information on a per zone and per detector output basis.

2.1.16.1 For each detection zone and time period, the statistical data shall consist of:
- volume,
- occupancy,
- speed,
- density,

- length,
- vehicle class – with a minimum of five length classifications,
- queue length, and
- delay.

2.1.16.2 The data shall be stored for selectable periods from 10 seconds to 60 minutes. There shall be capacity to store two parameters, every 15 minutes, on eight zones, for 30 days.

2.1.16.3 The accuracy of the statistics shall be greater than 96% accuracy under normal operating conditions (day and night), and at least 93% accuracy under artifact conditions.

2.1.16.4 The accumulated statistics shall be available through the serial port.

2.1.16.5 Statistical data shall not be lost during power outages.

2.2 ELECTRICAL REQUIREMENTS:

2.2.1 There shall be a serial data RS-232C I/O. This interface shall be used to configure the processor and communicate the accumulated statistical information. This interface will be connected to a laptop computer for configuration and diagnostics. This port shall also be used to connect to a modem for remote access.

2.2.1.1 The serial input connector should be located on the front of the processor.

2.2.1.2 The serial input shall be configurable for a minimum of 2400 to 56K BAUD, 8 bit, no parity, and 1 stop bit.

2.2.1.3 Serial cables shall be provided to connect to both laptop computer serial port (DB-9), and to a modem (DB-25).

2.2.2 There shall be a video input connector for each camera.

2.2.2.1 The input signal shall be NTSC, RS-170 (monochrome).

2.2.2.2 Each input shall be a 75Ω BNC connector. (BNC connectors may be placed on the interface cable.)

2.2.2.3 The processor shall be protected and isolated from the video inputs with surge suppressors.

2.2.3 There shall be a 75Ω, NTSC, RS-170 (monochrome), BNC output for a video monitor on the front of the processor or with a provided adapter cable. (See ¶ 2.1.15)

2.2.4 Power requirements:

2.2.4.1 The Processor shall operate on AC power from 89 VAC to 135 VAC, 57 Hz. to 63 Hz.

2.2.4.2 The processor power required shall not exceed 1 amp RMS and have a power factor better than 0.85 .

2.2.4.3 The processor shall be plugged into a NEMA 5-15R receptacle located in the signal control cabinet. A 3 to 6 foot power cord shall be provided.

2.2.5 Detection shall be output to the signal controller, conforming with the SDLC bus (NEMA TS 2-1998, section 3.3, or as amended). A SDLC compatible connector shall be on the front of the Processor.

2.2.6 The Processor shall have a NEMA TS-1 compatible connector and cable harness to provide thirty two (32) detector outputs. The cable shall be sized to connect into a size 6 signal cabinet

with the Processor on the top shelf. The cable shall have spade lugs and be labeled with the detector number.

2.2.7   The Processor shall operate with an ambient temperature range from -34°C (-30°F) to 74°C (165°F) at an altitude of 1500 m. (5000 ft.), and humidity from 0% to 95% non-condensing.

2.3 OTHER REQUIREMENTS:

2.3.1   The Processor shall be modular by design with plug-in circuit boards.

2.3.2   The Processor shall not exceed the maximum shelf space of 7.5 inch height, 19 inch width, and suitable to be placed on a 10 inch shelf.

2.4 DOCUMENTATION

2.4.1   Each Processor shall be provided with manual(s) with user's operation, and installation instructions. This shall describe the function and use of all of the configuration parameters and how to configure the system for optimal performance.

2.4.2   Each processor shall be provided with a maintenance manual, which shall describe the electronic circuit operations, troubleshooting, and have adequate information to maintain the system to the component level. The factory acceptance test shall be included in the manual.

2.4.3   There shall also be a software user's manual with details on interfacing to the Processor. There shall be descriptions for all of the communication protocol and the meaning of the data included.

2.5 PROCESSOR INTERFACE SOFTWARE

2.5.1   Windows-based applications software shall be provided for system configuration as well as continued monitoring and data collection.

2.5.2   The minimum PC configuration requirements shall exceed a Pentium I processor (266 MHz or faster), Microsoft Windows 98.

2.5.3   The processor shall maintain an operations log in non-volatile memory. At a minimum, the log shall contain:

2.5.3.1   Revision numbers for the current processor hardware and software components.
2.5.3.2   Title and comments for the detector configuration.
2.5.3.3   Date and time that detector configuration was downloaded.
2.5.3.4   Date and time that operations log was last cleared.
2.5.3.5   Date and time that communications were opened or closed.
2.5.3.6   Date and time of last power-up.
2.5.3.7   Date and time of hardware and software errors.

2.6 INTEGRATION AND TESTING

2.6.1   A factory test shall be successfully completed for each Processor. The test procedure shall be prepared by the supplier and be designed to demonstrate that the Processor hardware and software operate correctly, and that all functions are in conformance with these specifications. The procedure should be reproducible at the agency.

2.6.2   The Video Detection System (cameras, cabling, connections, and processor) shall be installed and tested for proper operation for 30 consecutive days. During the testing period, all equipment at the video detection system location shall operate without failure of any type. During the 30-day test period the agency reserves the right to conduct additional comparisons between video detection collected data and manual or loop-based data.

2.6.2.1 If any component malfunctions or fails to provide the capabilities specified herein, including accurate detection, during the 30-day test period, the vendor shall replace or repair the defective equipment within 48 hours of notification by the agency. Costs of correcting component malfunctions shall be borne by the vendor.

2.6.2.2 After the component malfunction has been corrected to the satisfaction of the agency, a new 30-day test period shall be started.

2.6.3   Warranty

2.6.3.1 The video detection processor shall be warranted by its supplier for a minimum of 2 years from date of purchase or 1 year from the date of installation, whichever is longer. The video detection supplier shall stock the necessary replacement products to maintain the operability of the system for a period of at least 5 years.

2.6.4   The vendor shall provide telephone customer support as required during normal business hours, at no cost during the warranty period.

2.7 METHOD OF MEASUREMENT

2.7.1   Video Detection Processor Assembly will be measured as a unit for each assembly delivered as directed by the State.

2.8 BASIS OF PAYMENT

2.8.1   Video Detection Processor Assembly, measured as provided above, will be paid for at the contract unit price each, which shall be payment in full for furnishing the video processor, video interface panel; documentation; interface software; for all testing, consisting of test procedure development, shipping; and declared and implied warranties. Furthermore, the vendor shall provide telephone customer support as required to insure the proper operation of the system.

3   VIDEO INTERFACE PANEL:

3.1 The video interface panel shall provide a termination point for the video signals coming into the signal cabinet, shall provide facilities to protect the Processor against damage from lightning, and to isolate the ground of the cables from that of the video processor.

3.2 Each video input shall have a ground isolation transformer and lightning arrestors, each with 75-ohm BNC connectors.

3.2.1   The ground isolation transformer shall provide 115 db of isolation at 60 Hz. The insertion loss shall be no greater than 0.5 db at 1.0 KHz

3.2.2   The lightning arrestors shall have a surge rating of 5,000 amps (8 x 20 microseconds) and a response time of 1 nanosecond or less.

3.3 The video interface panel shall be supplied with an interface cable(s) to connect to the Processor.

3.4 The video interface panel shall be supplied with hardware for mounting the panel to the "C" channels (similar to Unistrut channels) in a signal control cabinet.

3.5 The video interface panel shall provide a termination for power supplied to the cameras. The interface panel shall have AC power distribution terminal and suppressor.

4   VIDEO IMAGE DETECTION CAMERA ASSEMBLY

4.1 DESCRIPTION

4.1.1   Video camera assemblies shall be installed above the roadway looking down into the detection zones. These cameras shall generate a video image for the Processor.

4.1.2   Four cameras with sunshields, cables assemblies, and mounts shall be supplied with each processor unless otherwise ordered.

4.2 CAMERA SPECIFICATIONS

4.2.1   Camera shall be monochrome, charge-coupled device (CCD), 1/3-inch maximum format sensor with IR cut filter.

4.2.2   Minimum horizontal resolution shall be 570 lines.

4.2.3   Minimum vertical resolution shall be 492 line.

4.2.4   Shutter speed shall be automatically adjustable from 1/60 to 1/100,000 second.

4.2.5   Camera shall provide standard 4-pin iris control to the lens.

4.2.6   Signal-to-noise ratio shall be more than 46 db, weighted at 5 lux sensor illumination, AGC off, and 25°C

4.2.7   Minimum illumination for usable image shall be 0.02 lux (sensor) and 0.2 lux (scene)

4.2.8   Automatic gain control shall be selectable.

4.2.9   The output shall conform to RS-170 monochrome, NTSC format. (1.0 Vp-p into a 75-ohm load)

4.2.10   Gamma correction shall be 1.0

4.2.11   Bright overloads shall have the ability to tolerate vehicle headlights, aimed at the sensor, without blooming or smearing

4.2.12   Each camera shall be provided with the following lens (or equivalent).

4.2.12.1   Zoom: 5mm – 50mm; manual control
4.2.12.2   Iris: f1.4 – f185; automatic (4-pin standard plug)

4.2.12.3   Filter: 0.9 neutral density
4.2.12.4   Focus: 2m – infinity; manual
4.2.12.5   Lens mount: CS
4.2.12.6   The lens shall be easily field replaceable and shall be clearly identified with the focal length and aperture

4.2.13   The camera shall operate satisfactorily over an ambient temperature range from -34°C (-30°F) to 74°C (165°F) at an altitude of 1500 m. (5000 ft.). The camera assembly shall continue to operate in all weather conditions.

4.2.14   The camera and lens shall be enclosed in an environmental enclosure.

4.2.14.1   The enclosure shall meet NEMA-4, Enclosure 4, and IP65 ratings; and shall protect the camera and lens from dust and airborne particles, exposure to water and temperature extremes. The enclosure shall be fabricated from corrosion resistant aluminum, and finished in a white UV and weather-resistant paint. The front of the enclosure shall be tempered glass.
4.2.14.2   The enclosure shall be designed to be securely installed on the mounting bracket. (See ¶ 4.2.22)
4.2.14.3   All connections (e.g., video output, auto iris, power, etc.) shall be mounted on the rear of the enclosure, and shall have liquid-tight fittings.
4.2.14.4   Any devices required for maintaining the internal temperature of the camera and faceplate (e.g., heater, heat pump), and for providing the appropriate power supply to the camera, lens, and/or heaters (e.g., transformers), shall be integral to the environmental enclosure.

4.2.15   The camera shall be equipped with a sunshield to reflect solar heat and to shield the faceplate from direct exposure to the sun. The camera shall also be equipped with a faceplate heater to melt accumulated ice, snow, or condensation from obscuring the view of the camera. The sunshield shall include a provision for water diversion to prevent water from flowing in the camera's field of view.

4.2.16   The nominal dimensions of the environmental enclosure, including fittings, shall be 2.4-inches (H) x 4.0-inches (W) x 18.0-inches (L). The total weight of the environmental enclosure, complete with sensor, lens, fittings, heaters, and transformers, shall not exceed 10 pounds.

4.2.17   The camera assembly (i.e., camera, heating elements, auto-iris) shall operate with power from 89 to 135 VAC, 57 to 63 Hz.

4.2.18   Video shall be line locked to the AC power line zero-crossing.

4.2.19   Power shall be obtained from the power panel within the processor assembly cabinet.

4.2.20   The total power consumption of the camera assembly shall not exceed 4 watts. The integrated faceplate heater shall consume a maximum of 5 watts. The total power consumption shall be less than 15 watts per camera.

4.2.21   The camera assembly shall be resistant to vibration in accordance with IEC 68-2-30, or approved equivalent. The camera assembly shall be resistant to shock in accordance with IEC 68-2-27, NEMA TS-2 or approved equivalent.

4.2.22   There shall be all brackets, adapters, and hardware required to mount each camera assembly.

4.2.22.1   The mounting assembly shall be a Pelco AB-0172-3-48-SP (Description: "Astro-Brac Camera Mount w/Double Set Screw") or equivalent. (Pelco Products, 320 West 18th Street, Edmond OK 73013;   phone: 405-340-3434; web: www.pelcoinc.com)

4.2.22.2   Each mounting bracket kit shall be packaged one assembly to a container.

4.2.23   The vendor shall supply a cable assembly to connect video and power from each camera to the base of the camera pole (signal pole).

4.2.23.1   The cable assembly shall be 90 ft in length.

4.2.23.2   The cable shall be terminated at the camera end with weather sealed connection(s) and installation.

4.2.23.3   The connector(s) shall have stress relief backshells.

4.2.23.4   The video coax shall have a BNC connector termination at the base of the pole. The AC power leads will not be terminated.

4.2.23.5   The installer (agency) shall supply cabling and connectors from the video interface panel to the base of the pole. The vendor shall specify the cabling requirements in the installation documentation.

4.3 WARRANTY

4.3.1   The video detection camera assembly shall be warranted by its supplier for two (2) years from date of purchase or one (1) year from the date of installation, whichever is longer. The vendor shall be able to provide the necessary replacement products to maintain the operability of the system for a period of 5 years after purchase.

4.4 METHOD OF MEASUREMENT

4.4.1   The Video Image Detection Camera Assembly will be measured as a unit, each delivered as directed by the agency.

4.5 BASIS OF PAYMENT

4.5.1   The Video Image Detection Camera Assembly, measured as provided above, will be paid for at the contract unit price of each, which price shall be payment in full for selecting and furnishing the complete VIDs Camera Assembly, including sensor, lens, enclosure, mounting brackets, and cabling; for field verification of equipment and mounting requirements, and for all labor, tools, equipment, transportation, and incidentals necessary.

5 ENGINEERING FIELD SERVICES

5.1 DESCRIPTION

5.1.1   The supplier shall provide on-site services when requested by UDOT, including, but not limited to:

5.1.2   Field services shall be provided by experienced personnel familiar with use of the equipment and software. Experienced personnel shall include, but not be limited to, instructors, engineers, and field technicians.

5.1.3   Payment for on-site services will be on an 8-hour "person-day" basis with a minimum order of two (2) full days.

5.1.4   Time required to travel from out of the state to Utah shall not be eligible for payment. Travel time within Utah between UDOT sites is included in the 'person-day'.

5.1.5   All direct costs of travel, accommodations, and meals shall be included in the unit bid price per day for on-site services. No separate payments will be made for these travel costs.

5.1.6   On-site services may be required anywhere in the State of Utah. Field services will be scheduled at least two weeks in advance.

5.1.7   No payment will be made for on-site services which are required to trouble-shoot or resolve problems caused by malfunctions or failures of vendor's equipment or for work done under warranty.

5.2 METHOD OF MEASUREMENT

5.2.1   Engineering Field Services will be measured as Days, with each day consisting of an eight hour "person-day".

5.3 BASIS of PAYMENT

5.3.1   Engineering Field Services, measured as provided above, will be paid for at the contract unit price per day, which price shall be full compensation for furnishing field personnel to provide the field engineering services; and for all labor, equipment, transportation, and incidentals necessary to complete this item of work.

6   ALLOWANCE FOR MISCELLANEOUS ITEMS

6.1 DESCRIPTION

6.1.1   Under this item, UDOT will purchase miscellaneous video vehicle detection equipment parts on an as-needed basis in small quantities. This will include spare and replacement parts. Items purchased may include, but not be limited to, the following:

6.1.1.1 Processor components (modules, connectors, 8 video input expansion kit, etc.)
6.1.1.2 Camera assembly.
6.1.1.3 Camera cable.
6.1.1.4 Camera mounting hardware (for attachment on mast arm and luminaire arm).
6.1.1.5 Electronic components needed to make repairs.
6.1.1.6 Communication modems.

6.1.2   A price list or catalog for miscellaneous vehicle detection parts shall be included in the Bid Proposal. Any discount offered shall be indicated.

6.2 METHOD OF MEASUREMENT

6.2.1   This Item is measured as a Lump Sum. The value for this item is fixed as stated in the bid sheets and must be included by all bidders of this category in calculating the total for their proposal.

6.3 <u>BASIS of PAYMENT</u>

      6.3.1   Payment for equipment ordered under this item shall be made according to the price list, less any discount offered.

THIS BID RESULTED FROM BID # JG3153

FINET COMMODITY CODE(S) **(for agency use only)**

55080000000 – TRAFFIC CONTROLS AND EQUIPMENT, ELECTRIC SYSTEMS